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THE HOPI CRISIS

A REPORT TO ADMINISTRATORS

by

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about the worst possible attitude which the government could take toward these reciprocity-minded people. The Hopi believe in a just natural order in which all parts are interdependent through a law of Universal Reciprocity. The morale of the tribe depends on the maintenance of this type of equilibrating adjustment with the total environment, and the federal government is part of th environment.

The need for more land

The foremost felt need, from the standpoint of the Hopi themselves, is for more land. About 3,500 Hopi are now crowded on an area of 631,194 acres, of which only about 7,130 acres may be used for crop land, the remainder being range land and waste.[25] This is desert and semi-desert highland having an elevation of 5,000-6,800 feet, an average rainfall of only 11.5 inches, an average growing season of only 140 days, and an average temperature range of 98° to -15° Farenheit. The distribution of population, farm land and range lan by means, together with the carrying capacity of the range, is shown in figure 5.

With the exception of 163 acres which are under irrigation, the farm land is cultivated by precarious arroyo flood and dry farming methods. The breakdow of farm land use is as follows:

Total number of acres used for farming	7,130
Acres of irrigated gardens (Indian operated) . .	11
Acres of irrigated gardens (school operated) . .	5
Acres subjugated in Irrigation Division Projects	147
Acres used for flood water and dry farming . . .	6,967

25. The jurisdiction contains 624,064 acres of range land classified as follows

Grasslands	208,134 acres
Sagebrush	5,639 "
Browse	309,062 "
Pinyon and juniper	78,411 "
Waste	22,818 "

principle crop is maize supplemented by fruit, melons, beans, and garden produce.[26]

Practically every Hopi man is a farmer, still relying to a considerable extent on the ancient methods and hand tools, which are well adapted to the difficult desert conditions. By trial and error, however, the Hopi is gradually improving his farming methods.

"He experiments with new techniques and new varieties of plants, accepting those that are useful, rejecting the impractical or obsolete. Most of the ancient varieties of corn and other food plants have been discarded in favor of new varieties that are easier to grow or prepare, have a greater yield, or are more palatable. Modern agricultural implements are gradually replacing the ancient dibble, weed cutter, and rake. This is most marked at New Oraibi, where it is estimated that three-quarters of the household groups have plows and scrapers, and many of these also have teams and wagons. The government, through its agricultural extension work, is attempting to increase Hopi farming output by constructing flood irrigation projects, teaching the people irrigation farming, and improving the orchards by the introduction of new seedlings and trees suitable to the climate."[27]

Experimentation is severely limited by that inelasticity of the desert setting which plays a major role in the Hopi acceptance or rejection of new traits. Therefore, although improving in details, the essential farming

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26. The "Long Range Program for the Hopi Tribe" (p. 16) gives the approximate acreage and yield of the principal crops as follows:

Crop	Per cent of farmland acreage	Yield per acre
Corn	73	5 bushels
Orchards, fruit	13	no data
Melons	9	$2\frac{1}{2}$ tons
Beans	3	5 bushels
Potatoes	1	50 bushels
Irrigated garden produce	$\frac{1}{2}$	no data

27. Thompson and Joseph, op. cit., p. 20

technology of these people has been little altered in historic times, and farming by flood water and dry methods is still, as it was in the past, the basis of Hopi subsistence. It is estimated that 22 per cent of the annual income of the Hopi in 1942 was from agriculture, the average return per acre being about $8.00.[28] (Fig. 2.)

Livestock, introduced by the Spaniards, has become increasingly important in the economy of the Hopi in recent years to the extent that in 1942 it was responsible for 34 per cent of the annual income. But whereas the old established farming practices are part of every adult male's tools for living, and the farm lands are so divided that each clansman has a share (except on Third Mesa where most farm lands are owned individually, not by clans), by no means all Hopi men are herders. Indeed, it is estimated that out of the total of 645 Hopi families in 1942, almost half (about 300) owned no sheep or cattle.[29]

Besides wage work, which accounted for 36 per cent of the 1942 income and was chiefly government financed through Civilian Conservation Corps and Soil and Moisture projects, farming and herding are the major sources of Hopi subsistence. (Fig. 2). These facts give us a background for understanding the importance of the land base in the Hopi type of subsistence economy.

Recent loss of range and farm land

We know that one of the immediate factors which precipitated the local crisis was the legal settlement of the Hopi-Navaho boundary dispute by the Secretary of the Interior in 1943 in a way which, to the Hopi mind at least, seemed distinctly advantageous to their long-time rivals, the Navaho. Although this action did not deprive the tribe of much, if any, land they were actually using (inasmuch as in 1943 the Navaho occupied three-quarters of the

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28. "Long Range Program for the Hopi Tribe" op. cit., p. 16
29. Ibid., pp. 22, 28

original "Moqui" Reservation), the formal settlement was a great shock to the tribe and it has not been accepted by them.

The land dispute has been a controversy of long standing, and the settlement granted the Hopi a land use area of 631,194 acres, only about one-fourth the size of the original reservation which they claimed. The original "Moqui" reservation, a rectangular area of 2,472,166 acres in the heart of the Navaho reservation, was set aside by Executive Order in 1882, for the use of the Hopi and such other Indians as the Secretary of the Interior should see fit to settle thereon. Actually even at that early date there were many Navaho living in this area. The Navaho population has gradually increased and probably has intruded during the ensuing years, encroaching on range lands claimed by the Hopi and crowding the Hopi into an ever diminishing range in the immediate vicinity of their mesas.

Concomitant with the increasing pressure from Navaho herders has been the cumulative erosion of the Hopi lands, due to the effects of a natural erosion cycle which began about 1880 and which has been augmented progressively by over-grazing of the range. The combination of natural and man-made erosion has had a disastrous effect on Hopi economy, especially in the last decade when the population of the tribe has been increasing at the rate of 1.8 per cent a year. Not only has it practically denuded the range of plant cover, to the extent that the critical erosion stage was reached in the 1930's, but it has increased the depth of the major washes, thereby reducing the fan-shaped areas formerly watered at time of flood, and rendering them useless for arroyo flood farming.

To understand how this process works, it is necessary to review some facts about the topography of Hopiland. A glance at the map of the Hopi jurisdiction (See "The Hopi Way" p. 19) shows a white and a shaded area. The white

area represents the main desert floor (elevation 5,000 to 6,000 feet). The shaded area represents the mesa or tableland formation which rises abruptly out of the desert floor to a height of several hundred feet. This tableland formation, called Black Mesa, extends northward for some sixty miles into the Navaho reservation, gradually rising to a height of some 8,000 feet. On it grow scattered stands of juniper and pinyon interspersed with sagebrush. This table-like land mass makes possible the existence of sedentary town dwellers in the desert and distinguishes Hopiland from the surrounding Navaho country.

"It acts as a sort of subterranean reservoir, in which a small but relatively permanent water supply is stored. Moisture, seeping through its permeable sandstone surface to the underlying bed rock, finally emerges in the cliffs of its southern escarpments, in the form of springs. Near these springs the Hopi have for centuries maintained their pueblos.

"The mesa is also characterized by the presence of sand dunes which have a relatively high moisture-holding capacity and hence tend to prevent a rapid run-off after rains and to provide good land for dry farming."[30]

Black Mesa is drained by the ephermeral streams of the Tusayan Washes which flow southward toward the Little Colorado. "Formerly the outwash from the plateau areas fanned out on the slopes and in the valleys. Being of a sandy nature and holding moisture well, these fans were used for farming. Many large washes, such as Moencopi, Dinnebito, Oraibi, Polacca, and Jeddito, have become deeply entrenched in the principal valleys to the ruination of many of the farming areas. These washes are of such proportions that serious efforts to control them seem puny and ineffectual."[31] We get some idea of the extent and tempo of this type of erosion when we note that the Oraibi Wash has cut to a depth of about 80 feet in the last 50 years.

30. Thompson and Joseph, op. cit., p. 16
31. "Long Range Program for the Hopi Tribe" op. cit., p. xxiii

persuaded the Third Mesa group to accept the reduction program, which is reported to have been carried to completion.[34]

It should be stated here that all the lands of the original "Moqui" Reservation are claimed by the various Hopi villages, the claims to farm lands in the vicinity of the mesas being in most cases clear-cut and undisputed, while those to range lands at some distance from the mesas overlap to some extent. The farm lands of each village are owned and inherited through the matrilineal clans; farm lands being owned and inherited by the women from their mother s (except at Third Mesa where individual ownership and patrilineal descent is superseding the ancient custom). Livestock, on the other hand, is owned by individual men and inherited by their sons, rather than, according to the traditional Hopi way, by their sisters' sons, and each livestock owner has a range area established by continued use on the range land of his village.

As the entire Hopi range is in use there is little moving about of herds, a situation which, coupled with successive drought years, has brought about excessive over-grazing and serious damage to range forage. Inasmuch as village rangeland boundaries are subject to controversy, for purposes of range management three land management sub-units have been established by the government on the Hopi jurisdiction[35]--one for each mesa. Advisory committees, selected by the people of each mesa, assist in land management.

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34. Thompson and Joseph, op. cit., p. 25

35. The Hopi jurisdiction itself comprises Land Management Unit 6 of the 18 Units established within the boundaries of the Navaho Reservation. Range lands are administered under the Code of Federal Regulations and Article VII of the Hopi Constitution.

centuries ago, the Hopi, in spite of the exceedingly unfavorable natural cor
developed their own methods of farming without irrigation, chiefly by
installations
taking advantage of the best soils on the deltas or the sandy fans of the large
Modern science has been able to contribute very little to improve these
techniques. However, there are a few details, especially in connection
with the use of the introduced plow and fruit orchards and with the control of so
it
sion, that is believed will benefit the Hopi. To put these across, repre-
sentative field plots might be selected for the demonstration of planning, sea-
sonal plowing, contour listing, planting, protection against wind erosion, and
control of flood water.

Orchard rehabilitation might be demonstrated by pruning, spraying, re-
placement of unproductive trees by good commercial varieties, wind erosion con-
trol, and the utilization of flood run-off by the employment of spreaders. Since
fine peaches and grapes are in demand in the "quality"market, the Indians might
be taught the use of dehydration equipment and they might be encouraged and aided
in marketing their surplus fruit which might bring in an appreciable cash income.

No changes in farming methods should be recommended, however, until a new
technique has proved its superiority over the old by actual experimentation in
the area.

Irrigation[43]

Irrigation possibilities in Hopiland are extremely limited in both number
and size. There are no permanent streams, except for a few seeps in the bottoms
of deep washes and a few small springs. The diversion of flash floods from the
wide, deep, sandy washes is an expensive and a precarious undertaking. The Hopi
have long terraced and irrigated small patches of land around some of the springs
located below the mesas, where they plant vegetable gardens. There are, however,

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[43] Ibid., pp. 16, 19-20, 42, XXIV-XXIX

about eleven acres of such gardens. As a result of school and irrigation division projects, 152 additional acres have been brought under irrigation. It is estimated that another 280 acres on the jurisdiction are irrigable with additional construction.[94] (fig. 6). For the success of the entire economic program it would seem that this work should by all means be undertaken as soon as possible. Since the total estimated irrigable area in Hopiland is less than 450 acres, it is apparent that even at best only a small part of Hopi subsistence can be obtained by irrigation development farming, as compared with flood water and dry farming.

Grazing[45]

In contrast to their adeptness at farming, the Hopi are not very good stockmen.

Herding in the northern Arizona plateau imposes a certain degree of mobility on the herders which is somewhat out of keeping with the traditional sedentary Hopi life, and apparently the Hopi have not yet mastered this new industry with their age old technical skill, nor have they vested in it such strong sanctions of myth and ritual as they have farming.

The Government, through its extension activities, has attempted to raise the standard of animal industry among the Hopi by introducing sound stock management policies. Besides reduction of stock to approved range capacity, springs have been improved and small streams have been dammed to supply stock with water for at least part of the year, and active encouragement has been given to the breeding of stock, sheep dipping, the improvement of breeds by the introduction of purebred Rambouillet rams and registered Herefords, the segregation of rams in special pastures, the raising of fodder, the construction of corrals, and the organization of stock cooperatives.

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94. It is estimated that this construction would cost about $22,150. (Ibid., page 21). Irrigation works completed or under construction in the vicinity of Moencopi which is off the Hopi jurisdiction are not included in these estimates.

45. Hob. 34-5, 43

Fig. 6

Irrigation Developments on the Hopi jurisdiction, 1944

Unit	Area Irrigable	Area Under Constd. Works	Area Irrigated	Indian Farming
Hardrock	300	250	70	70
Jeddito	57	57	57	57
Phillips Farms	50	43	43	43
Moenkopi Gardens	6	3	3	3
Tuba Gardens	6	3	3	3
Hopi Gardens	8	4	4	4
Polacca-Hopi Miscellaneous Gardens	0	0	0	0
	427	360	180	180

of the Hopi stockmen in better herding practices and in their organization for grazing, breeding, and marketing efficiency.[48] [49]

Water supply and soil conservation

It is apparent that an increase in production through grazing and farming depends to an appreciable extent on increase in the available water supply and on watershed protection. Possibilities of augmenting the irrigated area have been discussed.

There are at present 174 water supply units on the Hopi jurisdiction. These units include drilled wells, shallow dug wells, springs, surface tanks, etc.,[50] which the government has built or developed. These units are at present maintained by the government. The "Long Range Program" proposes to drill 20 additional water wells, and to build storage tanks, troughs, and distribution systems.[51] It would seem exceedingly important to the success of the whole program that these developments be made as soon as possible.

The Soil Conservation Service (later succeeded by the Soil and Moisture Conservation Operations), following surveys made in 1933-34, began extensive operations in the Hopi area which reached a peak in 1935-37. These were primarily aimed at watershed protection by facilitating and encouraging proper land

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48. "Long Range Program' for the Hopi Tribe" op. cit., pp. 35, 42, xxvii
49. Ibid., pp. 19, 35-6, 43-4
50. The water supply units to March, 1945 were as follows:

Drilled wells (with windmill towers)	26
Artesian wells	2
Shallow dug wells (developed)	13
Developed springs	31
Undeveloped springs	25
Surface tanks (temporary water)	77
Total	174

(Superintendent, Hopi Agency, Correspondence, 1945)

51. The estimated cost of these improvements is $100,000.